## Revisions

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# Dell FluidFS Multitenancy Solution Guide

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1 Dell FluidFS overview

Dell™ FluidFS is a fully distributed file system that provides the tools necessary to manage file data in an efficient and simple manner. The underlying software architecture leverages a symmetric clustering model with distributed metadata, native load balancing, advanced caching capabilities, and a rich set of features. FluidFS removes the scalability limitations such as limited volume size associated with traditional file systems, and supports high capacity, performance-intensive workloads by scaling up (adding capacity to the system) and by scaling out (adding nodes, or performance, to the system).

Powered by FluidFS, the Dell FS8600 scale-out NAS solution consists of one to four FS8600 appliances configured as a FluidFS cluster. Each NAS appliance is a rack-mounted 2U chassis that contains two hot-swappable NAS controllers in an active-active configuration. In a NAS appliance, the second NAS controller that has one paired NAS controller is called the peer controller. The solution supports expansion through the addition of NAS appliances to the cluster as needed to increase performance.

The FS8600 shares a back-end infrastructure with the Dell EMC SC Series SAN. The SAN network connects the FS8600 to the SC Series array and carries the block-level traffic. The FS8600 communicates with the SC Series array using either the iSCSI or Fibre Channel protocol, depending on the NAS appliance configuration.
2 FluidFS and multitenancy

FluidFS version 6 introduces the multitenancy feature which enables the option to create up to 100 instances of a FluidFS cluster in a single appliance. With the FluidFS multitenancy feature enabled, FluidFS provides a logical isolation of data, management access, and authentication per tenant.

![FluidFS and multitenancy overview](image)

**Note:** By default, the multitenancy feature is disabled but the storage administrator can enable this feature.

2.1 FluidFS tenant scope

When the FluidFS cluster is first installed, a default tenant is created. When enabling multitenancy, each tenant has its own scope and also shares some resources from the default tenant.

The tenant scope includes the following:

- NAS volumes, export, and shares: Each tenant exclusively owns its volumes, shares, and exports.
- Networking: Each tenant can be configured with its own client networking and DNS IPs.
- Authentication: Each tenant independently defines its user repositories (AD, LDAP or NIS) including a separate local users repository.
- Protocol settings: Each tenant exclusively owns its access IP(s) and defines its own SMB, NFS, and FTP protocol settings, as well as interoperability parameters.
- Management: Each tenant can be optionally managed by dedicated administrator(s) or by a cluster administrator.

Shared cluster services include:

- Time: NTP configuration
- Third-party or external auditing
- Backup: NDMP
- Antivirus scanners
- Virtualization: VMware® servers list and VAAI support
- Management network
- Routing: static routes
- Physical controller IP address
3 Configuring FluidFS multitenancy

3.1 Enabling multitenancy on FluidFS

By default, FluidFS multitenancy is disabled but the administrator can enable this feature at any time using the Dell Storage Manager (DSM) or the FluidFS CLI.

To enable FluidFS multitenancy in DSM:

1. Log in to DSM and click the Summary tab.
2. Under the FluidFS Cluster Status menu, click Edit FluidFS Cluster Settings.
3. In the Edit FluidFS Cluster Settings window, click the checkbox, Multitenancy Enabled.

![Enabling multitenancy on a FluidFS cluster](image)
Once multitenancy feature is enabled, the **File system** tab shows tenants under the cluster name and makes the default tenant visible.

![FluidFS file system tab after enabling multitenancy](image)

**Figure 3** FluidFS file system tab after enabling multitenancy

### 3.2 Disabling multitenancy on FluidFS

Storage administrators can disable FluidFS multitenancy with the following restrictions:

- Only the default tenant must exist; all other tenants must be deleted.
- When deleting a tenant, all NAS volumes, shares, and exports must be deleted first (delete the share and the export of a NAS volume before deleting the NAS volume).

### 3.3 Creating and configuring a new tenant

To create a new tenant, run the Create Tenant wizard and provide the requested information.

1. To start the wizard, from the **File System** tab, click **Create Tenant**.
2. Provide the information for the new tenant:
   a. Tenant name: This may contain letters, numbers, underscores, and hyphens.
   
   ![Create Tenant](image1)

   b. Public IP: Specify one or more virtual IPs for file access.

   ![Create Tenant](image2)

   c. DNS: Specify the DNS server IPs and suffixes.

   ![Create Tenant](image3)
d. **Limits:** Limit the tenant capabilities (optional).

In this example, the tenant is limited to 100 GB of capacity, and the maximum number of NAS volumes, NFS exports, and SMB shares is set to 10.

![Limits](image1.png)

e. **Active Directory:** Provide information to integrate with the Active Directory servers (optional).

![Active Directory](image2.png)

f. **NFS User Repository:** Provide information to integrate with the NIS/LDAP servers (optional).

![NFS User Repository](image3.png)
After the wizard has completed, a new tenant is created under **Tenants** in the FluidFS cluster. Click the tenant to view the tenant status and information.
4 Tenant management

4.1 Tenant administrative access

In a multitenancy-enabled FluidFS cluster, storage administrators can delegate tenant management using the tenant administrator role.

Tenant administrators can perform the following tasks:

- View and modify assigned tenants
- View default tenant NAS volumes, NFS exports, and SMB shares

To create a new tenant administrator:

1. Log in to DSM as a cluster administrator.
2. Click the File System tab and click Cluster Maintenance.
3. From the Cluster Maintenance area, click Mail & Administrators.
4. Click Grant Administrative Privilege.
5. Uncheck Global Administrative Permission.

**Note:** To create a FluidFS cluster administrator, leave Global Administrative Permission checked.

6. If adding a non-local user, choose the default tenant.
7. Search for the user and click OK.

**Note:** To use the tenant local user, use the tenant name instead of the default tenant. For non-default tenants, only local users can be granted administrative access to the system if the storage administrator chooses to use AD/LDAP/NIS users for administrative purposes. Those user repositories must be accessible from the default tenant.
Now that the tenant administrator has been created, the storage administrator can assign single or multiple tenants for the tenant administrator to manage. To assign a tenant administrator to manage a tenant:

1. Right-click the tenant and click **Edit Settings**.
2. Click the **Administrators** tab.
3. In the **All Administrators** pane, add the user to the **Tenant Administrators** area.

**Note:** To make sure the cluster administrator also can manage the tenant, leave **System Administrators Access** enabled. This enables the cluster administrator to have modify and view permissions for that specific tenant. If unchecked, the cluster administrator can ONLY view this tenant and will not be able to create volumes, shares, and exports BUT will have access to the tenant settings and will be able to modify this option.

![Creating a tenant administrator](image)

**Figure 4** Creating a tenant administrator
4.2 Accessing tenant data

When storage administrators create a tenant, virtual IPs are provided for the tenant. Accessing tenant data is no different from accessing any FluidFS cluster. To access the tenant data, use the tenant virtual IP or the DNS name and the specific share or export.

**Note:** The default tenant shares and exports will NOT be visible when accessing the tenant virtual IPs.
4.3 Moving volumes between tenants

Storage administrators can move volumes from one tenant to another if needed. Movement of volumes to a different tenant will not move actual data but FluidFS will modify the metadata to perform this task.

To move a volume from one tenant to another:

1. Right-click the volume to move.
2. Click Move to Tenant.
3. Choose the tenant name as the new location for the volume and click OK.

**Note:** Before moving volumes between tenants, make sure to delete any NFS exports, SMB shares, home shares, FTP/HDFS landing directories, or any subnet restrictions that are applied to this volume. If any exist, FluidFS will not perform this operation and it will result in error.
4.4 Replicating between tenants

In addition to replicating between two or more FluidFS clusters storage administrators can also use replication between tenants on a local cluster or remote cluster.

To configure tenant to tenant replication:

1. From the File System tab, click the replication icon.
2. Highlight the cluster to add the replication tenants to, and click Edit Settings.
3. Click Add and choose the tenant in the local and the remote clusters.

![Replicating between tenants](image)

**Figure 7** Configuring tenant replication

**Note:** The default tenant on both the source and remote clusters are configured as partners by default.
5 Tenant monitoring

FluidFS provides storage administrators the option to monitor tenant information such as client activities and tenant usage.

5.1 Tenant client activities

FluidFS provides the following options to monitor client activities:

- **Sessions**: FluidFS displays the current active sessions to the tenant and the information regarding the session such as the client IP, protocol in use, connection time, and more.

**Note**: SMB Multichannel is supported only for SMB3 clients connected to shares on the DEFAULT tenant.

- **Open files**: FluidFS displays current open files, provides the ability to search for a specific open file, and provides the ability to close the file.
- **Virtual machines and appliances**: FluidFS displays virtual machines and appliances connected to the tenant.
- **SACL auditing events**: FluidFS displays SACL auditing events and provides the ability to search for events.

To monitor client activities per tenant, click the **File System** tab and click **Client Activity** under the desired tenant.

![Monitoring tenant client activities](image)

Figure 8 Monitoring tenant client activities
5.2 Tenant status and capacity usage

FluidFS provides cluster administrator privileges to monitor tenant status and capacity usage information. In addition to displaying the tenant information, the administrator can modify tenant settings or delete tenants. To view a list of tenants and their capacity information, from the File System tab, click Tenants.

![Image](image.png)

**Figure 9** Monitoring tenant status and capacity

5.3 Tenant events

FluidFS provides the option to monitor tenant events. Administrators with tenant administration privileges will be able to see the following events:

- Partial global cluster events such as hardware failure
- Service-related events
- Volume-related events

![Image](image.png)

**Figure 10** Monitoring tenant events
6 Multitenancy and cluster shared services

6.1 Tenants and NDMP
FluidFS provides the option to use the Network Data Management Protocol (NDMP) for backup purposes.

FluidFS NDMP support is a cluster shared service. With all tenants, the storage administrator can configure the NDMP backup user, port information, and DMA servers at the cluster level and all tenant data will be available for the NDMP backup application in use.

6.2 Tenants and antivirus protection
FluidFS provides the option to use a third-party antivirus application to protect data from viruses.

FluidFS antivirus support is a cluster shared service. With all tenants, the storage administrator can configure the antivirus servers and port information at the cluster level. Configuration of SMB share protection is done on each individual share.

6.3 Tenants and third-party auditing services
FluidFS provides the option to use third-party auditing services and also native SACL auditing.

Unlike native SACL auditing support, third-party auditing services are cluster shared services with only one tenant due to tenant isolation.
Technical support and resources

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